

# below the surface

an in-depth  
look at...



## Stormwater Treatment Areas

*Managed wetlands improving Everglades water quality*

### ON THE INSIDE

- Investing in a solution
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**The Everglades are at risk from excess nutrients found in stormwater runoff. These nutrients flow from lawns, farms, roadways and other developed areas. Stormwater Treatment Areas are constructed wetlands that remove excess nutrients. They play a vital role in protecting and restoring America's Everglades.**

Rainfall is South Florida's primary source of fresh water. It nourishes plants, fills ponds and seeps into the underground aquifer, replenishing the drinking water supply. In excess, it drains away in the canal system that protects South Florida from flooding.

Stormwater runoff also carries nutrients off the landscape, especially fertilizers used in suburban, agricultural and urban settings. Scientists have determined that a common ingredient in fertilizer – phosphorus – has put the fragile Everglades environment at risk. Phosphorus is a mineral that is essential for all life. It forms genetic material, builds bones and teeth and aids metabolism. But when excess phosphorus reaches natural wetlands like the Everglades, it does more harm than good.





**Stormwater Treatment Areas use “green” technology to remove excess phosphorus, a nutrient that can harm the Everglades environment.**



*Aerial rice planting helps stabilize wetland soils after hurricane damage.*



*Collecting and analyzing water samples is vital to wetland management.*

## **Phosphorus and Its Impact**

The Everglades is naturally a low-nutrient ecosystem. South Florida’s native wetland plants are adapted to this condition and thrive there. When a nutrient, such as phosphorus, enters this ecosystem in excess, plant growth is stimulated, producing an overabundance of undesirable vegetation. Cattail and other species respond with vigor, crowding out native wetland plants such as sawgrass and preventing the sun’s rays from reaching plants in the water. When this happens, aquatic insects, crustaceans and other invertebrates do not have enough to eat or enough oxygen to live, which means the fish and birds do not have enough to eat either. The impact of excess phosphorus in the Everglades is far-reaching indeed.

## **Investing in a Solution**

The good news is that the State of Florida has invested more than \$1 billion in water-quality improvements aimed at lowering phosphorus levels. A decade ago, before these improvements were put into place, phosphorus concentrations in Everglades-bound waters averaged 170 parts per billion (ppb). Today, as a result of Florida’s efforts, the concentrations in discharges to the Everglades are as low as 12 ppb, repeatedly surpassing the predictions for what could be achieved.

## **“Green” Technology at Work**

Florida’s Everglades Forever Act provided the momentum for this success story. It mandated and funded construction of treatment wetlands, known as Stormwater Treatment Areas (STAs). At present, more than 41,000 acres of land south of Lake Okeechobee have been converted to STAs. In western Palm Beach County, STA-3/4, at almost 17,000 acres, is the largest constructed wetland in the world. And more STAs are on the way: 5,000 acres of treatment wetlands were recently added to the existing STAs, and an additional 13,000 acres of treatment wetlands will be constructed in the coming years.

Everglades Stormwater Treatment Areas use “green” technology to remove phosphorus from the water. Wetland plants, such as cattail, southern naiad and algae, uptake phosphorus and use it in metabolic life processes. Some is also stored in their stems and leaves. Even after the plants die, sediments in the wetland retain phosphorus from the decaying plant matter. As a result, water flowing out of an STA has significantly less phosphorus than stormwater runoff flowing in.

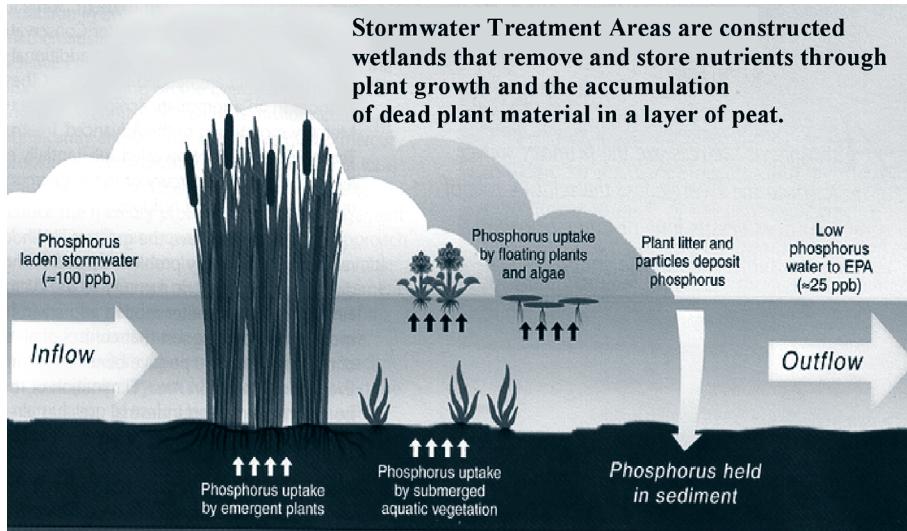
## **STAs in Key Locations**

By building STAs in key locations north of the Everglades, phosphorus in stormwater runoff can be reduced before it flows south into protected wetlands. The South Florida Water Management District’s regional canal system brings water to the treatment wetlands and then carries it into the Everglades. The map (on back) shows the location of existing STAs, major District canals and the STA expansions.

## **Meeting Mandated Goals for Reducing Phosphorus**

The Everglades Forever Act and other legal requirements provided the District with specific guidelines to improve Everglades water quality. One key component was the Everglades Construction Project, which provided for construction of the six STAs now in operation. Other mandated requirements included interim and long-term target concentrations for reducing phosphorus. At most locations throughout the Everglades, the long-term target concentration of 10 parts per billion (ppb) of phosphorus is already being met.

In 2003, the Florida Legislature adopted further strategies for achieving the long-term Everglades water quality goals. Known as the Long-Term Plan, these strategies provide for structural and vegetation enhancements to the STAs, as well as the STA expansions now being implemented. Collectively, these initiatives are providing significant water quality improvements to Everglades-bound waters.



## Operating & Maintaining an STA

Keeping an STA performing at peak efficiency is not simple. It is a living wetland, affected by natural conditions such as weather (rainfall, drought, hurricanes), plant growth rates and invasion of undesirable plant species. STAs have never before been used on the large scale now at work in the Everglades, so their operation and management is a process of ongoing learning and continual improvement.

Water quantity and water quality monitoring is a vital part of STA operations. Each treatment cell is monitored regularly to determine how the STA is performing. Operational decisions are then based on real-time data. STA performance data are continually assessed and are reported monthly and yearly. An annual summary of STA performance is also available in the annual South Florida Environmental Report, viewable online at [www.sfwmd.gov/sfer](http://www.sfwmd.gov/sfer).

Structural components of the STAs must be operated and maintained as well. These include more than a dozen pump stations, 200+ water control structures and more than 100 miles each of levees and canals. Mechanical repairs, preventative maintenance, erosion control and debris cleanup are essential and ongoing tasks that must be budgeted for and scheduled each year.

Responding to the unexpected is a large part of the job, too. In 2005, hurricane winds tore up much of the aquatic vegetation in the STAs and stirred up the STAs' phosphorus-laden sediments. Repairing these living wetlands presented many challenges. Fortunately, scientific research and experience gained through many years of managing the STAs were used effectively to expedite recovery. One example was to plant rice in several of the STA treatment cells. This quick-growing plant stabilized the soil and allowed essential aquatic vegetation, such as naiad and pondweed, to reestablish in the wetlands.

## Sustainability for the Future

Protecting Everglades water quality is a long-term commitment, and STAs will continue to play a vital role in this effort. Sustaining their effectiveness is essential. Ongoing research is uncovering new ways to maintain healthy plant communities and manage sediment buildup. The State of Florida and the South Florida Water Management District remain committed to achieving optimum phosphorus-reducing results.

## Wildlife in the Wetlands

Stormwater Treatment Areas are built specifically for improving Everglades water quality. However, their vast, shallow waters and rich plant life also make them outstanding habitat for Florida wildlife.

Wading birds, ducks and American alligators are found year-round in the treatment wetlands. Migratory birds use them, too, visiting in abundance during winter months. Rabbits, wild hogs, deer and the occasional Florida panther roam the banks and levees.

Because the STAs have a specialized cleansing function, public recreation is limited to activities that do not disturb the water and soils. Guided visitors can enjoy bird watching, and some hunting is allowed, under guidelines of the Florida Fish and Wildlife Conservation Commission.

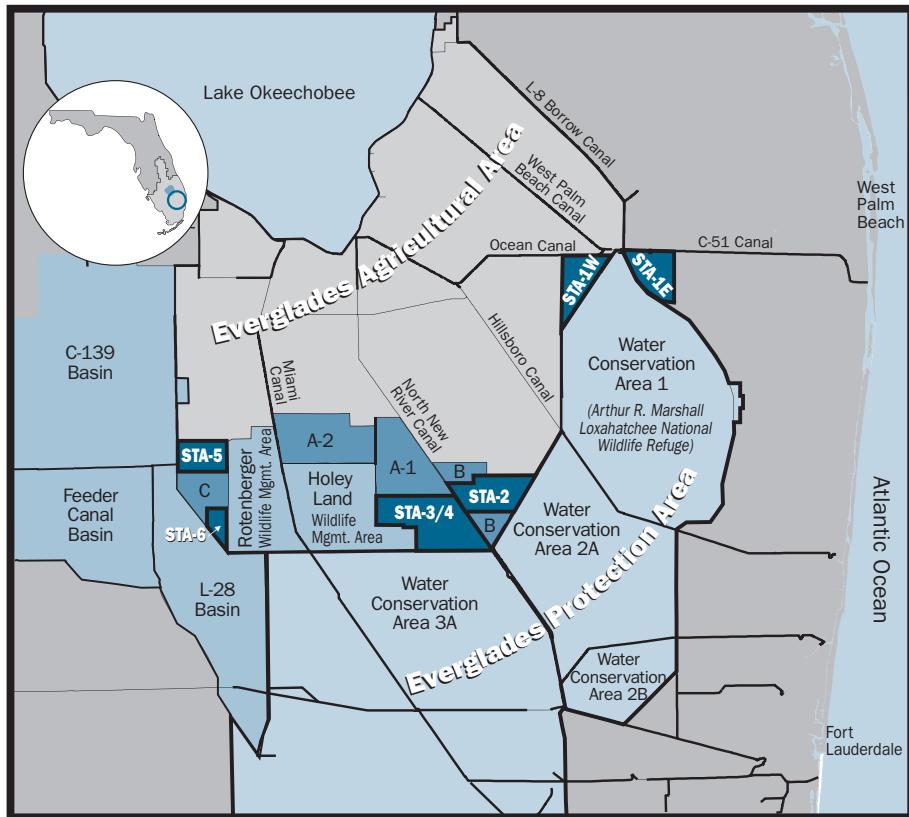
Keeping the treatment wetlands healthy and undisturbed is vital for Everglades restoration. Enhanced wildlife habitat is a great bonus!



*Great egret*



*American alligator*



*Locator map for Everglades Stormwater Treatment Areas.*



Annual reporting on performance of the Stormwater Treatment Areas is found in the South Florida Environmental Report, available online at [www.sfwmd.gov/sfer](http://www.sfwmd.gov/sfer)

Up-to-date information about STA research, enhancement projects, details of the Long-Term Plan and other components of managing and improving the Stormwater Treatment Areas can be found at [www.sfwmd.gov/sta](http://www.sfwmd.gov/sta)

**The South Florida Water Management District** is a regional, governmental agency that oversees the water resources in the southern half of the state. It is the oldest and largest of the state's five water management districts.

Our Mission is to manage and protect water resources of the region by balancing and improving water quality, flood control, natural systems and water supply.



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## DID YOU KNOW?

- Phosphorus concentrations in water flowing into the STAs are more than 100 parts per billion (ppb). Outflow concentrations are less than 50 ppb.
- Plants that cleanse water in Stormwater Treatment Areas include cattail, spikerush, water hyacinth and algae.
- Vegetation management is vital to STA success. Some herbicides are used to prevent invasive species from crowding out native plants.
- Treatment wetlands are also used in other parts of South Florida to improve water quality. North and east of Lake Okeechobee, treatment wetlands remove nutrients from water flowing into the lake, St. Lucie estuary and Indian River Lagoon.
- Birds found in the treatment wetlands include roseate spoonbills, whistling ducks, white storks, little blue herons, eagles and hawks.